# Importance of nuclear data for windowless spallation target design

Thierry Aoust, Edouard M. Malambu, Hamid Aït Abderrahim

*SCK CEN*

Accelerator driven systems consist of an accelerator delivering a proton beam to a spallation target that in turn couples to a sub-critical nuclear reactor. In the case of the MYRRHA concept, the spallation target considered is a liquid lead-bismuth target without window interface between the beam line and the spallation target. This concept avoids frequent replacement of the target and improves the spallation performances but will need special attention to secondary particles emitted with large angle and to volatile spallation products.

Preliminary calculations have shown that the rather high dose reached at the top shielding of the sub-critical core seems to be underestimated when the calculated spallation spectrum at large angle are compared to the experimental ones. The accurate evaluations of the flux levels are important to determine the doses and the activation rates around the beam line.

Various products, emitted directly by spallation reactions or indirectly due to the high temperature reached in the liquid target, can evaporate and stream to the beam line. The design of the recovery system need to evaluate carefully the production of volatile spallation products. To this aim, the distribution of heat generated in the target must be well calculated. This distribution will also allow to assess the impact of the density variation to the neutron source distribution.

In this paper we will deal with the importance of nuclear data needed to estimate accurately the level of radiation around the beam line and of volatile spallation products. Obviously, these aspects have direct implications on radioactive waste management and operational control of the spallation source. The assessments will be performed with the help of the MCNPX code compared to experimental measurements.

Email: taoust@sckcen.be